

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Applicant : Partridge, et al.

Art Unit : 2822

Serial No. : 10/828,495

Examiner : Thanh Y. Tran

Filed : April 20, 2004

Conf. No. : 4392

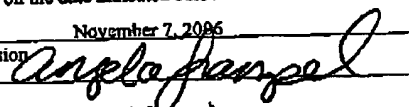
Title : STACKED MODULE SYSTEMS AND METHODS

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

The real party in interest hereby appeals from the Examiner's claim rejections in the Office action mailed April 6, 2006 (the "*April Rejection*"), in the above-referenced application. In the April Rejection, the Examiner rejected claims 1-27, some of which have been rejected twice or more. Under 37 C.F.R. § 41.31(a)(1), all rejected claims (*i.e.*, claims 1-27) are appealed.

This appeal brief is submitted with respect to a Notice of Appeal under 37 C.F.R. § 41.31 that was filed on August 7, 2006.

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Applicant : Partridge, et al.
 Serial No. : 10/828,495
 Filed : April 20, 2004
 Page : 2 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

RECEIVED
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NOV 07 2006

TABLE OF CONTENTS

I.	REAL PARTY IN INTEREST	3
II.	RELATED APPEALS AND INTERFERENCES	3
III.	STATUS OF CLAIMS	4
IV.	STATUS OF AMENDMENTS	4
V.	SUMMARY OF CLAIMED SUBJECT MATTER.....	4
VI.	GROUND OF REJECTION TO BE REVIEWED ON APPEAL	6
VII.	ARGUMENT.....	7
A.	Rejection of Claims 9-11 and 21-22 under 35 U.S.C. § 102(e) as Being Anticipated by Komiyama.....	8
B.	Rejection of Claims 1-4, 12, 16-18, and 23 under 35 U.S.C. § 103(a) as Being Unpatentable Over Komiyama in View of Pan.....	18
1.	Claims 1-4, 12, 16, 17, and 23.....	18
2.	Claim 18.....	21
C.	Rejection of Claims 5-8, 13-15, 20, and 24 under 35 U.S.C. § 103(a) as Being Unpatentable Over Komiyama in View of Pan as Applied to Claim 1 and Further in View of Komoto.....	23
D.	Rejection of Claim 19 under 35 U.S.C. § 103(a) as Being Unpatentable Over Komiyama in View of Pan as Applied to Claim 1 and Further in View of Chiang.....	24
E.	Rejection of Claim 26 under 35 U.S.C. § 103(a) as Being Unpatentable Over Komiyama in View of Nicewarner and Pan	25
F.	Rejection of Claim 27 under 35 U.S.C. § 103(a) as Being Unpatentable Over Komiyama in View of Nicewarner.....	26
G.	Rejection of Claim 25 For Unstated Grounds.....	26
H.	Conclusion	27
VIII.	CLAIMS APPENDIX.....	29
IX.	EVIDENCE APPENDIX.....	33
X.	RELATED PROCEEDINGS APPENDIX	34

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 3 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

RECEIVED
CENTRAL FAX CENTER

NOV 07 2006

I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Staktek Group L.P. ("*Staktek*"), the assignee of all right, title and interest in the above-referenced application. See Reel 015260, Frame 0409 of the Patent Assignment records (recorded Apr. 20, 2004).

II. RELATED APPEALS AND INTERFERENCES

An ex parte appeal that may be related to, directly affect, be directly affected by, or have a bearing on the Board's decision in this appeal, is pending in the following U.S. Patent Application:

Applicant	:	Partridge et al.
Serial No.	:	10/836,855
Filed	:	April 30, 2004
Examiner	:	Thanh Y. Tran
Art Unit	:	2822
Conf. No.	:	1433
Title	:	STACKED MODULE SYSTEMS AND METHODS

According the Office's Patent Application Information Retrieval system, as of November 3, 2006, the appeal brief for Application Serial No. 10/836,855 has been entered and forwarded to the examiner in that case, who is also the examiner in the case for which this brief is submitted. Application Serial No. 10/836,855 and the application for which this brief is submitted have the same priority claims to related applications, and the appeal brief filed for Application Serial No. 10/836,855 discusses the Koriyama and Pan references further identified and discussed below in this brief.

The Applicants, Staktek, and Staktek's legal representatives in this case do not know of any other prior or pending appeals, interferences, or judicial proceedings that may be related to, directly affect, be directly affected by, or have a bearing on the Board's decision in this appeal.

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 4 of 34

RECEIVED
CENTRAL FAX CENTER

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

NOV 07 2006

III. STATUS OF CLAIMS

Claims 1-27 are pending in the application. ~~Claims 2-8~~, 10-17, 19, 20, and 22-25 are original, and claims 1, 9, 18, 21, 26, and 27 are previously presented. Claims 1-27 stand rejected. Claims 1-27 are hereby appealed.

IV. STATUS OF AMENDMENTS

No amendments have been filed in this case subsequent to the April Rejection.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Claims 1, 9, 18, 21, 26 and 27 are in independent format. The following summary of the claimed subject matter is based on various of the disclosed embodiments and refers to reference characters corresponding to elements recited in the written description and the drawings. In presenting this summary of the claimed subject matter as required by 37 C.F.R. § 41.37(c)(v), no waiver, surrender, or disclaimer of claim scope is made, and this summary should be considered as having no effect on the scope of the claims. Cf. MPEP § 608.01(m).

Claim 1 is directed to a high-density circuit module (10) that, in disclosed embodiments, includes a first CSP (18) and a second CSP (16) disposed above the first CSP (18) in stacked disposition (*e.g.*, Figs. 1 and 2, Description ¶ [0019]); a first form standard (34) disposed, in substantial part, above the first CSP (18) (*e.g.*, *id.*, Description ¶¶ [0023], [0024]); flex circuitry (*e.g.*, 30, 32) connecting the first (18) and second (16) CSPs and positioned to be, in part, beneath the first CSP (18) and, in part, above the first form standard (34) and beneath the second CSP (16) (*e.g.*, Figs. 1 and 2, Description ¶¶ [0022], [0026]); the flex circuitry comprising a first side and a second side and a covercoat on each of the first and second sides (*e.g.*, Description ¶¶ [0036], [0037]); and at least one metallic bond (*e.g.*, Figs. 1 and 2, Description ¶¶ [0025], [0032], [0035]) attaching the flex circuitry (*e.g.*, 30, 32) and the first form standard (34).

Claim 9 also is directed to a high-density circuit module (10). The circuit module (10) has a first CSP (18) and a second CSP (16) stacked above the first CSP (18) (*e.g.*, Figs. 1 and 2, Description ¶ [0019]); a first form standard associated with the first CSP (18) (*e.g.*, *id.*, Description ¶¶ [0023], [0024]); a second form standard associated with the second CSP (*e.g.*,

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 5 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

Figs. 1 and 2, Description ¶ [0023]); and flex circuitry comprising a first side and a second side and a covercoat on each of the first and second sides (e.g., Description ¶¶ [0036], [0037]).

Claim 26 also is directed to a high-density circuit module (10). The circuit module (10) includes a first CSP (18) and a second CSP (16) disposed above the first CSP (18) in stacked disposition (e.g., Figs. 1 and 2, Description ¶ [0019]); a first form standard (34) disposed, in substantial part, above the first CSP (18) (e.g., *id.*, Description ¶¶ [0023], [0024]); flex circuitry (e.g., 30, 32) connecting the first (18) and second (16) CSPs and positioned to be, in part, beneath the first CSP (18) and, in part, above the first form standard (34) and beneath the second CSP (16) (e.g., Figs. 1 and 2, Description ¶¶ [0022], [0026]); and at least one metallic bond (e.g., Figs. 1 and 2, Description ¶¶ [0025], [0032], [0035]) attaching the flex circuitry (e.g., 30, 32) and the first form standard (34).

Claim 18 is directed to a method of creating a high-density circuit module (10) comprising the steps of providing a form standard (34) and first (18) and second (16) CSPs (e.g., Figs. 1 and 2, Description ¶ [0019]); attaching the form standard (34) to the first CSP (18) (e.g., Figs. 1 and 2, Description ¶ [0023]); applying a first metallic material (e.g., 47) to at least one part of the first form standard (Fig. 4, Description ¶¶ [0025], [0032]); providing flex circuitry (e.g., 30, 32) comprising a first side and a second side and a covercoat on each of the first and second sides with an area where flex metallic material is exposed (Description ¶¶ [0032], [0036], [0037]); disposing the flex circuitry adjacent to the first form standard to create an area of contact between the flex metallic material and the first metallic material (e.g., Fig. 5, Description ¶ [0032]); and selectively applying heat to the area of contact (e.g., *id.*, Description ¶¶ [0033], [0034]).

Claim 21 is directed to a unit (39) (e.g., Fig. 5) for use in a stacked circuit module (10) comprising a CSP (18); a form standard (34) attached to the CSP (18); and flex circuitry (e.g., 31) attached to the form standard (34) and comprising a first side and a second side and a covercoat on each of the first and second sides (e.g., Description ¶¶ [0036], [0037]).

Claim 27 is directed to a unit (39) (e.g., Fig. 5) for use in a stacked circuit module (10) comprising a CSP (18); a form standard (34) attached to the CSP (18); and flex circuitry (e.g., 31) attached to the form standard (34) and comprising at least two conductive layers (e.g., Description ¶¶ [0036], [0037]).

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 6 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB
RECEIVED
CENTRAL FAX CENTER
NOV 07 2006

The application under appeal incorporates by reference U.S. Application Serial No. 10/453,398 that has issued as U.S. Patent No. 6,914,324 (*"the '324 Patent"*). In its Figures 4 and 5, the '324 Patent shows additional detail of flex circuitry (30) comprising a covercoat (50, 52) on each of the first and second sides of the flex circuitry and at least two conductive layers (54, 58) (*e.g.*, the '324 Patent at col. 6, ll. 13-21).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Staktek requests review of the following grounds of rejection asserted by the Examiner in the April Rejection:

- A. Rejection of claims 9-11 and 21-22 under 35 U.S.C. § 102(e) as being anticipated by U.S. Pat. No. 6,329,708 to Komiyama (*"Komiyama"*);
- B. Rejection of claims 1-4, 12, 16-18, and 23 under 35 U.S.C. § 103(a) as being unpatentable over Komiyama in view of U.S. Pat. No. 6,588,095 to Pan (*"Pan"*);
- C. Rejection of claims 5-8, 13-15, 20, and 24 under 35 U.S.C. § 103(a) as being unpatentable over Komiyama in view of Pan as applied to claim 1 and further in view of U.S. Pat. Pub. No. 2003/0016710 to Komoto (*"Komoto"*);
- D. Rejection of claim 19 under 35 U.S.C. § 103(a) as being unpatentable over Komiyama in view of Pan as applied to claim 1 and further in view of U.S. Pat. No. 6,803,651 to Chiang (*"Chiang"*);
- E. Rejection of claim 26 under 35 U.S.C. § 103(a) as being unpatentable over Komiyama in view of U.S. Pat. No. 5,776,797 to Nicewarner (*"Nicewarner"*) and Pan;
- F. Rejection of claim 27 under 35 U.S.C. § 103(a) as being unpatentable over Komiyama in view of Nicewarner; and
- G. Rejection of claim 25 for unstated grounds.

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 7 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

RECEIVED
CENTRAL FAX CENTER

NOV 07 2006

VII. ARGUMENT

Two claim limitations are at the heart of this appeal. Each of the independent claims in this application¹ recites a "form standard" and "flex circuitry." In rejecting each of the pending claims, the Examiner's application of Komiyama demonstrates an implicit claim construction of those claim terms that is wholly improper and incorrect. The Examiner's application of Pan to reject many of the pending claims further demonstrates an implicit claim construction of the claim term "form standard" that is wholly improper and incorrect.

The Examiner alleges that a wide variety of divergent and dissimilar structures in the cited references are each a "form standard" and dissects flexible circuitry into component parts to find elements purportedly corresponding to other structures in the claims. In doing so, the Examiner exceeds the latitude given the Office in construing claim terms. In essence, the Examiner is treating the terms "form standard" and "flex circuitry" found in the claims "like a nose of wax which may be turned and twisted in any direction" to read on any dissimilar structure in the cited references that might happen to have a cross-sectional illustration simulating the cross-sectional illustration of a form standard and flex circuitry in the drawings of the present application. White v. Dunbar, 119 U.S. 47, 51-52 (1886). The claim limitations "form standard" and "flex circuitry" are not a nose of wax, and it is improper for the Examiner to treat them as one.

The Examiner also makes other incorrect and unsupportable characterizations of the applied references in rejecting many of the dependent claims on appeal. Although the Examiner's errors in applying Komiyama and Pan render all of these rejections improper, Staktek nevertheless appeals in this brief several of the more flagrant mischaracterizations.

¹ The pending independent claims are claims 1, 9, 18, 21, 26, and 27, all of which are appealed herein.

Applicant : Partridge, et al.
 Serial No. : 10/828,495
 Filed : April 20, 2004
 Page : 8 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CTP-MB

A. Rejection of Claims 9-11 and 21-22 under 35 U.S.C. § 102(e) as Being Anticipated by Komiyama

This appeal presents claims 9-11 and 21-22 together to stand or fall collectively. The Examiner rejected claims 9-11 and 21-22 under 35 U.S.C. § 102(e) as anticipated by Komiyama. Independent claim 9 recites:

9. (Previously Presented) A high-density circuit module comprising:
 a first CSP;
 a second CSP stacked above the first CSP;
 a first *form standard* associated with the first CSP;
 a second *form standard* associated with the second CSP;
 and
 flex circuitry comprising a first side and a second side and
 a covercoat on each of the first and second sides.

(Emphasis added). Independent claim 21 recites:

21. (Previously Presented) A unit for use in a stacked circuit module comprising:
 a CSP;
 a *form standard* attached to the CSP; and
 flex circuitry attached to the *form standard* and comprising
 a first side and a second side and a *covercoat on each of the first and second sides.*

(Emphasis added). The terms of claims 9 and 21 emphasized above, at least, are not found in Komiyama as alleged by the Examiner.

A claim term is generally given the ordinary and customary meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention. E.g., Phillips v. AWH Corp., 415 F.3d 1303, 1314 (Fed. Cir. 2005) (en banc); MPEP § 2111.01, Part II. In construing a claim term, the "person of ordinary skill in the art is deemed to read the claim term ... in the context of the entire patent, including the specification." Id. Thus, the

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 9 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

specification is "the primary basis for construing the claims." *Id.* at 1315. During prosecution, the Office gives claims their broadest reasonable construction "in light of the specification as it would be interpreted by one of ordinary skill in the art." *Id.* at 1316. The interpretation used by the Office, however, *must be reasonable*: "Claims are not to be read in a vacuum and while it is true they are to be given the broadest reasonable interpretation during prosecution, their *terms still have to be given the meaning called for by the specification* of which they form a part." *In re Royka*, 490 F.2d 981, 984 (CCPA 1974) (emphasis added).

The written description of this application provides the required context for construction of the term "form standard" as such term would be understood by a person of ordinary skill in the art in light of the entire patent application. Among other descriptions, the following nonexhaustive and nonlimiting context is provided:

The form standard provides a physical form that allows many of the varying package sizes found in the broad family of CSP packages to be used to advantage while employing a standard connective flex circuitry design. In a preferred embodiment, the form standard will be devised of heat transference material, a metal, for example, such as copper would be preferred, to improve thermal performance.

In constructing modules in accordance with some preferred modes of the invention, when attaching the form standard to the flex circuitry, metallurgical bonds are created between flex circuitry and the form standard.

Paragraphs [0012]-[0013].

Form standard 34 is, in a preferred embodiment, devised from copper to create ... a mandrel that mitigates thermal accumulation while providing a standard sized form about which flex circuitry is disposed. Form standard 34 may also be devised from nickel plated copper in preferred embodiments. . . . [The form standard] need not be thermally enhancing although such attributes are preferable.

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 10 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

Paragraph [0024]. From the foregoing context, a person of ordinary skill in the art in light of the entire specification would understand that the term "form standard" comprehends and includes within its scope both metal components and nonmetal components.

Moreover, in a preferred embodiment the "form standard" of the current application is copper, an electrically conductive metal. The fact that a form standard can be metal or nonmetal—and thus either conductive or nonconductive—need not be set forth in the claims. Rather, the issue is the ordinary and customary meaning that the term "form standard" would have to a person of ordinary skill in the art in the context of this specification. From the context of the specification, a person of ordinary skill in the art would understand that, in any structure using a form standard, the ability of the form standard to perform its intended function in the invention *does not depend on whether it is made out of a conductive material or a nonconductive material*. In other words, on seeing a form standard in any of the many possible embodiments of the invention, a person of ordinary skill in the art would understand that the form standard could be *made out of conductive or nonconductive material* without departing from the invention and *without interfering with operation of the circuit module* in which the form standard is disposed. Thus, the context of the specification of this application makes it absolutely clear that, in light of the entire specification, a person of ordinary skill in the art would *not* understand the term "form standard" to include within its meaning or scope any component that *must be nonconductive* for the embodiment in which that component is used *to work*.

The written description further makes clear that a form standard is something along which flex circuitry is disposed, rather than being a part of flex circuitry. For example:

In a preferred embodiment, an adhesive 33 may also be employed *between* form standard 34 . . . and the flex circuitry 32 that is *about* form standard 34

Application at ¶ [0026] (emphasis added).

With reference to Fig. 3, combination 37 is depicted as consisting of *form standard* 34 attached to CSP 18 which, when *attached to flex circuitry*, is adapted to be employed in module 10.

Application at ¶ [00288] (emphasis added).

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 11 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

Also shown are glue applications indicated by references 43 which are, when glue is employed to *attach form standard 34 to the flex circuitry*, preferably liquid glue.

Application at ¶ [0029] (emphasis added).

This causes the *glue line between the flex circuitry and form standard 34* to be thicker than may be desired.

Application at ¶ [0030] (emphasis added).

Fig. 4 depicts a preferred alternative ... providing a stable *bond 35 between form standard 34 and the flex circuitry*. . . . When *form standard 34 is brought into proximity with the flex circuitry*, ... bond 35 is created.

Application at ¶ [0032] (emphasis added); see also ¶ [0035] (referring to "sites where *form standard 34 and flex circuitry are adjacent*") (emphasis added). From the foregoing context, a person of ordinary skill in the art in light of the entire specification would understand that the term "form standard" does not comprehend within its meaning any components of the flex circuitry of the circuit module.

Those of ordinary skill in the art are aware of various configurations of flex circuitry. For example, the specification of the present application describes various embodiments of flex circuitry which may be used in the invention in addition to the many other embodiments of flex circuitry known to those of ordinary skill in the art that may also be used in the invention:

In a preferred embodiment, flex circuits 30 and 32 are *multi-layer flexible circuit structures that have at least two conductive layers*. Other embodiments may, however, employ flex circuitry, either as one circuit or two flex circuits to connect a pair of CSPs, that have only a *single conductive layer* and may exhibit the variety of simple construction parameters that are known to those of skill in the art *with such features as covercoats on one, both or neither side*.

Application at ¶ [0036] (emphasis added). In addition, U.S. Pat. App. No. 10/453,398 (filed June 3, 2003, and now U.S. Pat. No. 6,914,324 ("*the '324 Patent*") incorporated by reference into the

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 12 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

present specification describes various embodiments of "flex circuits ('flex', 'flex circuits' or 'flexible circuit structures')." The '324 Patent, col. 4, ll. 28-29. For example, the '324 Patent describes an embodiment in which:

Flex 30 has a *first outer surface 50* and a *second outer surface 52*.

Flex circuit 30 has at least two *conductive layers interior to first and second outer surfaces 50 and 52*. . . . Intermediate layer 56 lies between first conductive layer 54 and second conductive layer 58. There may be more than one intermediate layer, but one intermediate layer of polyimide is preferred.

The '324 Patent, col. 6, ll. 13-23 (emphasis added). Thus, those of ordinary skill in the art at the time of the present invention thus would know that a flex circuitry can comprise *conductive layers interior to outer layers that electrically insulate the conductive layers*. The disclosures of the present specification are consistent with those found even in references relied on by the Examiner. For example,

In general, *flex circuits* are fine, *conductive filaments or formed traces laminated between, overmolded with, or otherwise adhered to, a layer of a flexible, dielectric material, such as a polyimide tape*.

Pan, col. 1, ll. 46-50 (emphasis added). In addition, the flexible tape of Komiyama, (see Komiyama, col. 3, ll. 45-46)

includes insulating layers and a plurality of conductive layers that are sandwiched between the insulating layers,

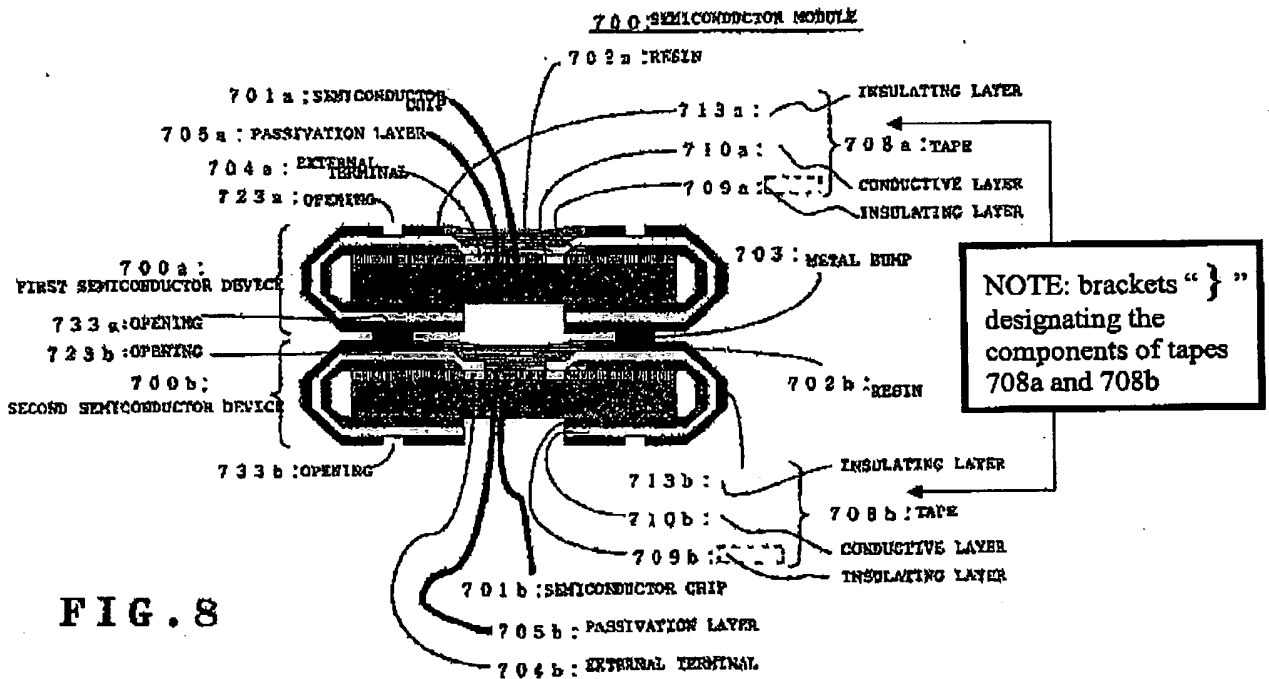
Komiyama, col. 1, ll. 59-61 (emphasis added). Accordingly, to the extent that the conductors of a flex circuitry are generally insulated by insulating layers (a covercoat, for example), a person of ordinary skill in the art would view the *insulator as part of the flex circuitry, and not a separate component along which the other parts of the flex circuitry may be disposed*. In addition, the foregoing discussion demonstrates that a person of ordinary skill in the art, upon encountering a component having a conductive layer between two insulating layers, would not consider the conductive layer alone to be "flex circuitry."

Applicant : Partridge, et al.
 Serial No. : 10/828,495
 Filed : April 20, 2004
 Page : 13 of 34

Attorney's Docket No.: 21260-024001 / 234-094-CIP4/CIP-MB

Based on the meaning of the terms "form standard" and "flex circuitry" that a person of ordinary skill would understand from the context of the present specification and the Komiyama and Pan references, the following discussions show that the Examiner has turned and twisted those terms like a nose of wax to read on very dissimilar structure in the cited references. According to the Examiner, with respect to claim 9 Komiyama discloses in figure 8 a high-density circuit module having "a first form standard ('insulating layer' 709b)," "a second form standard ('insulating layer' 709a), and "flex circuitry ('conductive layer' 710b) comprising . . . a covercoat ('insulating layer' 713b) on *each* of the first and second sides." April Rejection, at 2 (emphasis added). With respect to claim 21, the Examiner alleges that Komiyama discloses in figure 8 a stacked circuit module having "a form standard ('insulating layer' 709b)" and "flex circuitry ('conductive layer' 710b) comprising . . . a covercoat ('insulating layer' 713b) on *each* of the first and second sides." April Reject, at 3 (emphasis added).

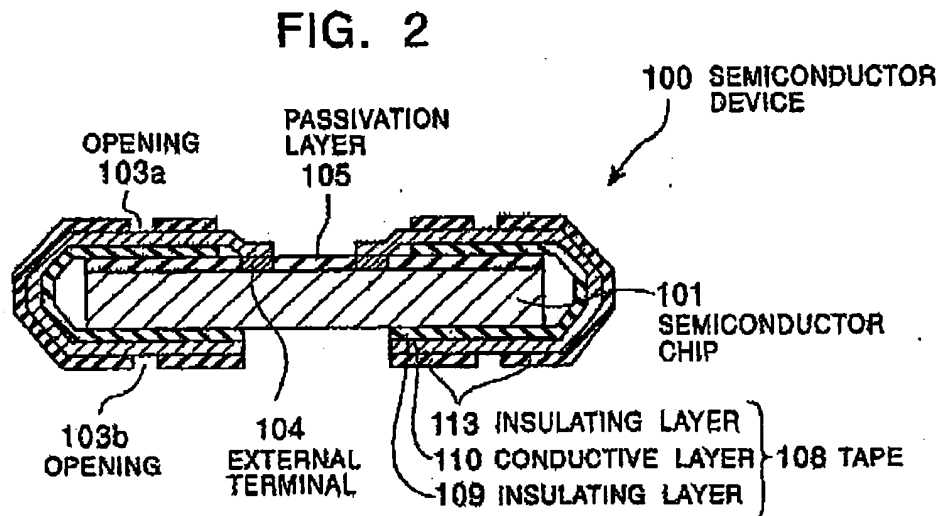
Figure 8 of Komiyama is set forth below, with annotation relating to the components of tapes 708a and 708b:



Applicant : Partridge, et al.
 Serial No. : 10/828,495
 Filed : April 20, 2004
 Page : 14 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

In Figure 8, insulating layers 709a and 709b are labeled as *components* of tape 708a and 708b, respectively.² Except for Figure 8, Komiyama does not disclose specifics about tapes 708a or 708b or their respective components such as insulating layers 709a and 709b. Komiyama, however, does illustrate and discuss "insulating layer" components 109, 113, 509a, 513a, 909, and 913 illustrated variously in Figures 2-6 and 10 of Komiyama. The embodiment of Figure 2 is an example:



The tape 108 *includes* insulating layers 109, 113 with the *conductive layers which are sandwiched between the insulating layers 109, 113*. For example, the conductive layers 110 are made of copper (Cu). The insulating layer 109 is made of polyimide or glass epoxy, *while the insulating layer 113 is made of solder resist*.

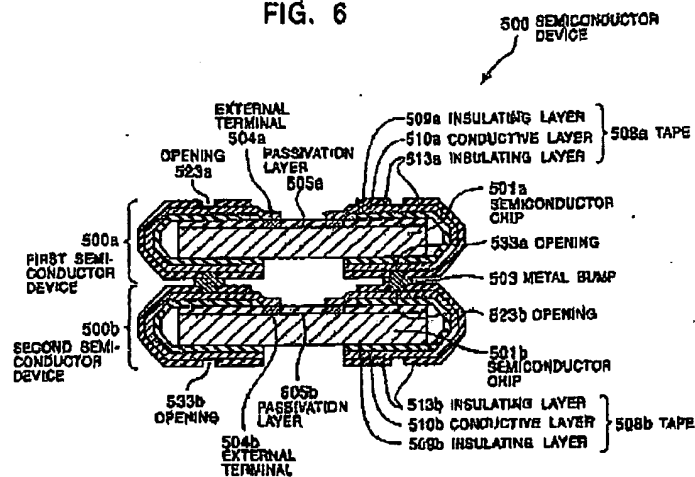
Komiyama, col. 3, ll. 7-12 (emphasis added). The embodiment of Figure 6 is another example:

² As noted in the annotation for Figure 8, the brackets designate insulating layer 709a, conductive layer 710a, and insulating layer 713a as components of tape 708a and insulating layer 709b, conductive layer 710b, and insulating layer 713b as components of tape 708b.

Applicant : Partridge, et al.
 Serial No. : 10/828,495
 Filed : April 20, 2004
 Page : 15 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

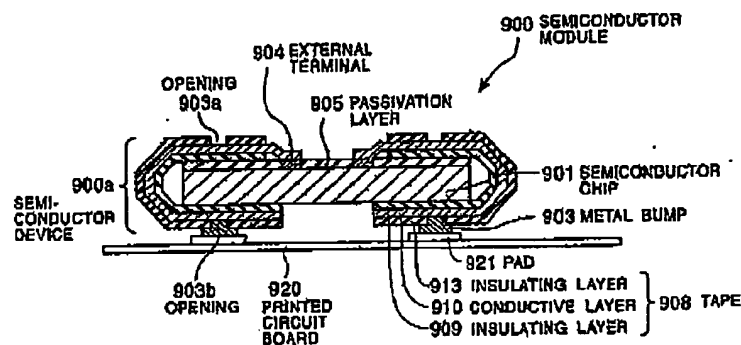
FIG. 6



The tape 508a *includes* insulating layers 509a, 513a and the *conductive layers 510a which are sandwiched between the insulating layers 509a, 513a*. For example, the conductive layer 510a is made of copper (Cu). The insulating layer 509a is made of polyimide or glass epoxy, while the insulating layer 513a is made of solder resist.

Komiyama, col. 4, ll. 51-57 (emphasis added). The embodiment of Figure 10 is yet another example:

FIG. 10



The tape 908 *includes* insulating layers 909, 913 and *conductive layers 910 which are sandwiched between the insulating layers*

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 16 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

909, 913. The conductive layer 910 is made of copper (Cu), for example. The insulating layer 909 is made of polyimide or glass epoxy, while the *insulating layer 913 is made of solder resist.*

Komiyama, col. 6, ll. 30-35 (emphasis added). Thus, Komiyama itself compels the conclusion that insulating layers 709a and 709b are integral with—and one of the two insulating layers of—*tapes 708a and 708b respectively.* The disclosure of tapes 708a and 708b of Komiyama as comprising insulators 709a, 709b, 713a, and 713b and conductive layers 710a and 710b as constituent parts is completely consistent with the meaning that a person of ordinary skill in the art would understand for a flex circuitry having a single conductive layer with insulative layers on each side of the conductive layer.

Rather than viewing the term “form standard” as a person of skill in the art would, though, the Examiner instead makes a wholly unreasonable interpretation that a “form standard” is a component of a flexible tape and that “flex circuitry” is nothing more than a single metal conductive layer. The Examiner then dissects the flexible tape of Komiyama to allegedly find “form standards” 709a and 709b (actually *insulating layers* of tapes 708a and 708b) and “flex circuitry” 710b (actually only a *single metal conductive layer* of the flexible tape 708b). As established in the discussion above, a person of ordinary skill in the art would not view a conductive layer such as layer 710b of Komiyama to be within the meaning and scope of the term “flexible circuitry.”

In addition, the meaning of the term “form standard” for a person of ordinary skill in the art does not include an integral component of flex circuitry such as insulating layers 709a or 709b of Komiyama. Moreover, the disclosure of Komiyama further clearly compels the conclusion that insulating layers 709a and 709b perform an insulating function and *must be insulating for the module to work*, which is completely different from the form standards of the present specification that can be made out of conductive materials without affecting the operation of the module. As established in the discussion above, person of ordinary skill in the art, in light of the entire specification of this application, would clearly not understand an “insulating layer,” which must be insulative for the module to work, to be within the meaning of the term “form standard.”

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 17 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

Regardless of the foregoing, the Examiner's dissection of flexible tapes 708a and 708b of Komiyama fails for a more basic reason. Claims 9 and 21 each recite a "covercoat on *each of the first and second sides*" of the flex circuitry. (Emphasis added). The Examiner purports to find in Komiyama "a covercoat ('*insulating layer*' 713b) on *each* of the first and second sides." April Rejection, at 2, 3 (emphasis added). As the figures and discussion of Komiyama above make clear, insulating layer 713b is only *on one side* of flexible tape 708b, not *each* side as required by claims 9 and 21. Insulating layer 709b cannot be the covercoat on the other side, because the Examiner has already dissected it away, allegedly to be the form standard. Under the Examiner's view of Komiyama, the flex circuitry does not have a covercoat on each of its first and second sides. Thus, claims 9 and 21 do not read on Komiyama.

The Examiner's dissection of flexible tapes 708a and 708b of Komiyama into alleged "form standards" and "flex circuitry" clearly violates the interpretive limitations on the Office illustrated by In re Royka, 490 F.2d at 984 ("Claims are not to be read in a vacuum and while it is true they are to be given the broadest reasonable interpretation during prosecution, their terms still *have to be given the meaning called for by the specification of which they form a part.*") (emphasis added). In rejecting the pending claims, it is impermissible for the Examiner to simply look at the cross-section illustrations of Komiyama, find various structures with apparent geometric similarities to entirely different structures illustrated in the pending application, and find a correspondence based on the geometric similarities. There simply is no reasonable interpretation of the term "form standard" in which a component of a flexible tape, or a component that must be electrically insulative to function, would be rendered or considered a form standard.

Because Komiyama does not disclose every limitation of independent claim 9, claim 9 is not anticipated by Komiyama under 35 U.S.C. § 102(e). E.g., Verdegaal Bros. v. Union Oil Co., 814 F.2d 628, 631 (Fed. Cir. 1987). Each of claims 10 and 11 depends directly or indirectly from claim 9 and therefore incorporates by reference all the limitations of claim 9. 35 U.S.C. § 112, ¶ 4. Because Komiyama does not disclose every limitation of claim 9, Komiyama necessarily does not disclose every limitation of claims 10 and 11. Accordingly, claims 10 and 11 are not anticipated by Komiyama under 35 U.S.C. § 102(e). E.g., Verdegaal Bros., 814 F.2d at 631.

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 18 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

Because Komiyama does not disclose every limitation of independent claim 21, claim 21 is not anticipated by Komiyama under 35 U.S.C. § 102(e). Claim 22 depends from claim 21 and therefore incorporates by reference all the limitations of claim 21. Because Komiyama does not disclose every limitation of claim 21, Komiyama necessarily does not disclose every limitation of claim 22. Accordingly, claim 22 is not anticipated by Komiyama under 35 U.S.C. § 102(e). E.g., Verdegaal Bros., 814 F.2d at 631.

For the foregoing reasons, Staktek respectfully requests that the rejection of claims 9-11 and 21-22 under 35 U.S.C. § 102(e) as anticipated by Komiyama be reversed.

B. Rejection of Claims 1-4, 12, 16-18, and 23 under 35 U.S.C. § 103(a) as Being Unpatentable Over Komiyama in View of Pan

The rejection of claims 1-4, 12, 16-18, and 23 under 35 U.S.C. § 103(a) as being unpatentable over Komiyama in view of Pan cannot stand because the combination of Komiyama and Pan does not establish a *prima facie* case of obviousness. Claims 1-4, 12, 16, 17, and 23 are presented together to stand or fall collectively, and claim 18 is presented separately.

1. Claims 1-4, 12, 16, 17, and 23

As set forth above in section VII.A, Komiyama does not disclose a form standard and flex circuitry having a first side and a second side and a covercoat on each of the first and second sides as recited in independent claims 9 and 21. Like independent claims 9 and 21, claim 1 recites a "form standard" and "flex circuitry" that comprises "a first side and a second side and a covercoat on each of the first and second sides." For claim 1, the Examiner also relies on Komiyama as teaching a form standard and flex circuitry having a first side and a second side and a covercoat on each of the first and second sides. For the same reasons as explained above in section VII.A of this brief, however, Komiyama does not disclose a form standard and flex circuitry having a first side and a second side and a covercoat on each of the first and second sides as recited in claim 1. That discussion will not be repeated here, but section VII.A is incorporated in this section by reference.

Applicant : Partridge, et al.
 Serial No. : 10/828,495
 Filed : April 20, 2004
 Page : 19 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

Pan does not cure the deficiencies of Komiyama. In the April Rejection, the Examiner alleges that Pan "discloses in figure 2 ... form standard (*'thin film' 19*)."

April Rejection, at 4 (emphasis added). Absolutely no explanation is provided that would support the conclusion that a person of ordinary skill in the art, in light of the entire specification of this application, would understand a "thin film" to be within the meaning of the term "form standard." In fact, Pan itself discloses that a "thin film" as disclosed in Pan cannot be a "form standard."

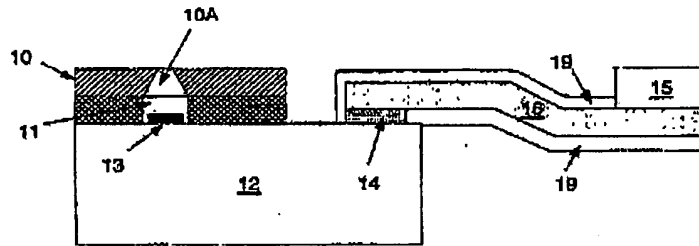


Fig. 2

According to Pan, Figure 2 (reproduced above) shows "a print head substrate 12" and a "bonding pad 14" providing electrical connection to the print head components. Pan, col. 3, ll. 26-32. In the embodiment:

The bonding pad 14 is bonded by a conductive *bonding beam 16* to a conductive trace (not shown) on a *flexible tape circuit 15*. A conductive connection is formed by the bonding pad 14, bonding beam 16, and conductive trace (not shown) on a flexible tape circuit 15.

Id., ll. 32-37 (emphasis added).

"Thin film" 19 of Pan is "a thin *insulating film* of uniform thickness" formed by *electrophoretic plating*. E.g., Pan, col. 2, ll. 33-34, 45-46; col. 3, ll. 37-39, 55-57, 65-67; col. 4, ll. 47-49 (emphasis added). Thus, it is clear that the "thin film" 19 of Pan is a component *applied to a physical form* such as bonding beam 16 or bonding beam 53 by plating. E.g., Pan, col. 3, ll. 33-39, 49-57; col. 4, ll. 46-49. In contrast, the "form standard" of the present invention "provides a physical form." Application at ¶ [0012].

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 20 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

Moreover, the "thin film" 19 of Pan is necessarily electrically *insulating*, rendering it completely different from a "form standard" of the present invention. Electrical insulation of thin film 19 is crucial to the invention of Pan, because "current initially increases (indicator 40) until a thin film begins to form on the surface of the exposed connection thereby *insulating the surface and restricting current flow* (indicator 41) until a film of uniform thickness covers the exposed connection." Pan, col. 3, l. 64 through col. 4, l. 2 (emphasis added). As established by the discussion above, a person of ordinary skill in the art would *not* understand the term "form standard" to include within its meaning any component *that must be nonconductive* for the embodiment in which that component is used *to work*. There simply is no reasonable interpretation of the term "form standard" that includes a "thin film" formed by "plat[ing] with a polymer using electrophoresis." *E.g.*, Pan, col. 3, ll. 37-39. Thus, thin film 19 of Pan is not a "form standard" within the context of the present specification.

To establish a *prima facie* case of obviousness, the prior art references must teach or suggest all the claim limitations. *E.g.*, *In re Royka*, 490 F.2d at 985; MPEP § 2143. Komiyama and Pan combined fail to teach or suggest all of the claim limitations of independent claims 1, 9, and 21, and thus claims 1, 9, and 21 are patentable over Komiyama in view of Pan. If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 1076 (Fed. Cir. 1988). Accordingly, claims 2-4, 12, 16, 17, and 23 are patentable over Komiyama in view of Pan.

Establishment of a *prima facie* case of obviousness also requires some suggestion or motivation to modify the reference or to combine reference teachings. *E.g.*, *In re Kahn*, 441 F.3d 977, 986 (Fed. Cir. 2006); MPEP § 2143. The existence of a proper suggestion or motivation depends on "whether a person of ordinary skill in the art, possessed with the understandings and knowledge reflected in the prior art, and motivated by the general problem facing the inventor, would have been led to make the combination recited in the claims." *In re Kahn*, 441 F.3d at 988.

The Examiner has not put forth a coherent suggestion or motivation to modify Komiyama or Pan or to combine Komiyama and Pan. The Examiner alleges simply that "it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the circuit module of Komiyama by using at least one metallic bond material as taught by Pan

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 21 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

for providing a thermally conductive connection between the flex circuitry and the chips/CSPs." *E.g.*, April Rejection, at 4 (emphasis added). The Examiner does not explain how a metallic bond *attaching flex circuitry to a form standard* would do anything to provide a thermally conductive connection between the flex circuitry and the chips/CSPs. In addition, the purported "form standard" of Komiyama—*e.g.*, "insulating layer 709b"—is in direct contact with the purported "flex circuitry" of Komiyama—*metal* "conductive layer 710b." The Examiner has not articulated any coherent reason that a person of skill in the art would want to add another metal component—*e.g.*, conductive bonding beam 16 of Pan—to attach metal "conductive layer 710b" and "insulating layer 709b." Certainly, that addition will not produce "a thermally conductive connection between the flex circuitry and the chips/CSPs." Thus, the Examiner has failed to set forth any suggestion or motivation that would have led a person of skill in the art to make the modification or combination.

For the foregoing reasons, Staktek respectfully requests that the rejection of claims 1-4, 12, 16, 17, and 23 under 35 U.S.C. § 103(a) as being unpatentable over Komiyama in view of Pan be reversed.

2. Claim 18

Claim 18 is method claim reciting the steps of providing a *form standard* and *flex circuitry*, disposing the flex circuitry adjacent to the form standard to create an area of contact between metallic material exposed on the flex circuitry and metallic material applied to the form standard, and "*selectively applying heat* to the area of contact." (Emphasis added). For the reasons set forth above in sections VII.A and VII.B.1 of this brief, which sections are incorporated in this section by reference, the combination of Komiyama and Pan does not teach or suggest a form standard and flex circuitry as those terms are used in this specification and claim 18. In addition, the Examiner relies on the same alleged suggestion or motivation to modify Komiyama or Pan or to combine Komiyama and Pan demonstrated above in section VII.B.1 of this brief to be insufficient. Because the combination of Komiyama and Pan does not render all of the limitations of claim 18 and no coherent motivation to combine Komiyama and Pan has been established, claim 18 is patentable over the combination of Komiyama and Pan. *E.g.*, *In re Royka*, 490 F.2d at 985; *In re Kahn*, 441 F.3d at 988.

Applicant : Partridge, et al.
 Serial No. : 10/828,495
 Filed : April 20, 2004
 Page : 22 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

The Examiner's rejection of claim 18 fails for additional reasons. According to the Examiner, "Pan discloses in figure 2 a high-density circuit module wherein a flex circuitry ('flex circuit' 15) is attached to the first form standard ('thin film' 19) with a first metallic material ('conductive bonding beam' 16); and the first metallic material ('conductive bonding beam' 16) is *inherent* for *selectively applying heat* to the area of contact (pad 14) [bonding beam 16 is *inherent* for *selectively applying heat* to the area of contact (pad 14) *because bonding beam 16 is a conductive material*]." April Rejection, at 6-7 (emphasis added).

As a preliminary matter, in claim 18 the area of contact to which heat is selectively applied is contact between metallic material exposed on the flex circuitry and metallic material applied to the form standard. Thus, under the Examiner's view that "thin film" 19 is a "form standard," pad 14 of Pan cannot be the "area of contact" recited in claim 18 because pad 14 of Pan is remote from any contact between "bonding beam 16" and flex circuit 15.

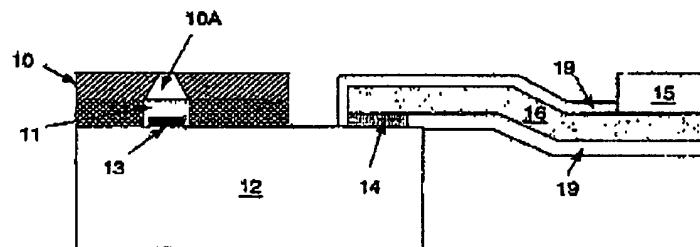


Fig. 2

Moreover, the fact that a conductive material might be used to selectively apply heat is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534 (Fed. Cir. 1993); *In re Oelrich*, 666 F.2d 578, 581-82 (CCPA 1981); MPEP § 2112 Part IV. "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference. . . . Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" *In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999) (citations omitted). The disclosures of Komiyama and Pan do not teach the selective application heat, and any heating that might be called for by Komiyama or Pan or their combination has not been demonstrated by the Examiner to require selective

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 23 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

application of heat instead of global application of heat. Therefore, Komiyama and Pan combined fail to teach or suggest yet another of the claim limitations of independent claim 18, and for yet another reason claim 18 is patentable over Komiyama in view of Pan. E.g., In re Royka, 490 F.2d at 985.

For the foregoing reasons, Staktek respectfully requests that the rejection of claim 18 under 35 U.S.C. § 103(a) as being unpatentable over Komiyama in view of Pan be reversed.

C. Rejection of Claims 5-8, 13-15, 20, and 24 under 35 U.S.C. § 103(a) as Being Unpatentable Over Komiyama in View of Pan as Applied to Claim 1 and Further in View of Komoto

The rejection of dependent³ claims 5-8, 13-15, 20, and 24 under 35 U.S.C. § 103(a) as being unpatentable over Komiyama in view of Pan and further in view of Komoto cannot stand because the combination of Komiyama, Pan, and Komoto do not establish a *prima facie* case of obviousness.

For the reasons set forth above in sections VII.A, VII.B.1, and VII.B.2 of this brief, which sections are incorporated in this section by reference, the combination of Komiyama and Pan does not teach or suggest a form standard and flex circuitry as those terms are used in this specification and in independent claims 1, 9, 18, and 21. The Examiner has not alleged that Komoto discloses a form standard and flex circuitry. Because the combination of Komiyama in view of Pan and further in view of Komoto does not teaches or suggests all of the claim limitations of independent claims 1, 9, 18, and 21, Komoto does not cure the deficiencies of the combination of Komiyama and Pan. Accordingly, dependent claims 5-8, 13-15, 20, and 24 are patentable over Komiyama in view of Pan and further in view of Komoto. E.g., In re Royka, 490 F.2d at 985.

³ Claims 5-8 depend from claim 1 addressed above in section VII.B.1, claims 13-15 depend from claim 9 addressed above in section VII.A, claim 20 depends from claim 18 addressed above in section VII.B.2, and claim 24 depends from claim 21 addressed above in section VII.A.

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 24 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

For the foregoing reasons, Staktek respectfully requests that the rejection of dependent claims 5-8, 13-15, 20, and 24 under 35 U.S.C. § 103(a) as being unpatentable over Komiyama in view of Pan and further in view of Komoto be reversed.

D. Rejection of Claim 19 under 35 U.S.C. § 103(a) as Being Unpatentable Over Komiyama in View of Pan as Applied to Claim 1 and Further in View of Chiang

In the April Rejection, the Examiner has not asserted that Chiang discloses a form standard or flex circuitry as those terms are used in this specification and claim 18, from which claim 19 depends. Therefore, based on the discussion above in section VII.B.2, which section is incorporated in this section by reference, the Examiner has failed to establish that the combination of Komiyama in view of Pan and further in view of Chiang teaches or suggests all of the claim limitations of independent claim 18 or claim 19 depending therefrom. Accordingly, claim 19 is patentable over the combination of Komiyama, Pan, and Chiang. E.g., In re Royka, 490 F.2d at 985.

The rejection of claim 19 fails for additional reasons. Claim 19 recites the "method of claim 18 further comprising the step of using vibration to perform the step of selectively applying heat to the area of contact." The Examiner alleges that "Chiang teaches the method of using vibration to perform the step of selectively applying heat to the area of contact (see col. 13, lines 7-10)." Chiang cannot be read so broadly, however. According to Chiang:

[T]he capillary is *heated* to about 150 to 200° C., and the capillary exerts a downward force of about 25 to 45 grams and provides horizontal ultrasonic oscillatory motions with a frequency of about 60 to 120 kHz. The combination of *heat*, pressure *and* ultrasonic *vibration* places the wire ball in a soft state which is easy to deform and forms a ball bond that contacts and is metallurgically bonded to pad 116 and metal trace 144.

Chiang, col. 13, ll. 3-10 (emphasis added). Thus, Chiang teaches the application of conventional heating. Although vibration is present in Chiang, the reference is silent about its function, which

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 25 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

could include supplanting flux, reducing surface tension, dispersing surface oxides, and other effects of cavitation bubbles resulting from the vibration.

In addition, the Examiner has failed to establish any coherent suggestion or motivation to modify the reference or to combine reference teachings. According to the Examiner, "it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify the apparatus and the corresponding method of Komiyama in view of Pan by using vibration method for performing heat as taught by Chiang *for providing a good bonding connection which is easy to be deformed by vibration.*" April Rejection, at 9-10 (emphasis added). The connections in Chiang are "formed in openings," col. 12, l. 57, and deformation of a wire ball might provide advantages in filling the opening. The Examiner, however, has not set forth any teaching or suggestion that easy deformation of metallic material exposed on a flex circuitry or metallic material applied to a form standard would be desirable, or that a person of skill in the art would be led to make the combination recited in claim 19. For this reason also, the Examiner has failed to set forth a *prima facie* case of obviousness of claim 19. E.g., In re Kahn, 441 F.3d at 988.

For the foregoing reasons, Staktek respectfully requests that the rejection of dependent claim 19 under 35 U.S.C. § 103(a) as being unpatentable over Komiyama in view of Pan and further in view of Chiang be reversed.

E. Rejection of Claim 26 under 35 U.S.C. § 103(a) as Being Unpatentable Over Komiyama in View of Nicewarner and Pan

Independent claim 26 recites a form standard, flex circuitry, and at least one metallic bond attaching the flex circuitry and the form standard. For the reasons set forth above with respect to claim 1 in section VII.B.1, which section is incorporated in this section by reference, the combination of Komiyama and Pan does not disclose a form standard, flex circuitry, and at least one metallic bond attaching the flex circuitry and the form standard as those terms are used in this specification and claim 19. In addition, for the reasons set forth in VII.B.1 above, the Examiner has not set forth a coherent suggestion or motivation for modifying the combination of Komiyama and Nicewarner or combining Pan with Komiyama and Nicewarner. Because the

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 26 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

combination of Komiyama, Nicewarner, and Pan does not render all of the limitations of claim 26 and no coherent motivation to combine Komiyama, Nicewarner, and Pan has been established, claim 26 is patentable over the combination of Komiyama, Nicewarner, and Pan. E.g., In re Royka, 490 F.2d at 985; In re Kahn, 441 F.3d at 988.

For the foregoing reasons, Staktek respectfully requests that the rejection of claim 26 under 35 U.S.C. § 103(a) as being unpatentable over Komiyama in view of Nicewarner and Pan be reversed.

F. Rejection of Claim 27 under 35 U.S.C. § 103(a) as Being Unpatentable Over Komiyama in View of Nicewarner

Independent claim 27 recites a form standard and flex circuitry. For the reasons set forth above with respect to claim 9 in section VII.A.1, which section is incorporated in this section by reference, Komiyama does not disclose a form standard and flex circuitry as those terms are used in this specification and claim 27. The Examiner relies on Nicewarner solely for disclosure of a flex circuit having two conductive layers. Because the combination of Komiyama and Nicewarner does not render all of the limitations of claim 27, claim 27 is patentable over the combination of Komiyama and Nicewarner. E.g., In re Royka, 490 F.2d at 985.

For the foregoing reasons, Staktek respectfully requests that the rejection of claim 27 under 35 U.S.C. § 103(a) as being unpatentable over Komiyama in view of Nicewarner be reversed.

G. Rejection of Claim 25 For Unstated Grounds

Because the "Office Action Summary" of the April rejection states that claim 1-27 are rejected, the Examiner apparently rejected claim 25. The Examiner, however, did not provide any basis, explanation or rationale for rejection of claim 25. Based on the discussions above, however, a rejection of claim 25 cannot be maintained.

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 27 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

Claim 25 depends from independent claim 21, and thus incorporates by reference all the limitations of such independent claim. 35 U.S.C. § 112, ¶ 4. Because Komiyama, Pan, Komoto, Chiang, and Nicewarner combined fail to teach or suggest all of the claim limitations of independent claim 21, those references combined necessarily do not disclose every limitation of dependent claim 25. See section VII.A of this brief, incorporated in this section by reference. Accordingly, dependent claim 25 is patentable over the references relied on by the Examiner. E.g., In re Royka, 490 F.2d at 985.

For the foregoing reasons, Staktek respectfully requests that the rejection of claim 25 be reversed.

H. Conclusion

As set forth above, the Examiner's application of Komiyama demonstrates an implicit claim construction of the claim terms "form standard" and "flex circuitry" that is wholly improper and incorrect. The Examiner's application of Pan to reject many of the pending claims further demonstrates an implicit claim construction of the claim term "form standard" that is wholly improper and incorrect. The Examiner's implicit claim constructions exceed the latitude given the Office in construing claim terms. The claim limitations "form standard" and "flex circuitry" are not a nose of wax to be turned and twisted in any direction to read on any dissimilar structure in the cited references. Reversal of the rejections of claims 1-27 is appropriate and is hereby respectfully requested.

Please charge the fee of \$500 for filing this brief and the fee of \$120 for a one month extension of time to Deposit Account No. 06-1050. Please apply any other charges or credits to Deposit Account No. 06-1050.

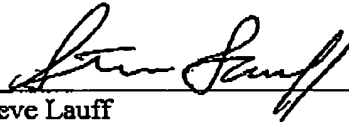
Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 28 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

Respectfully submitted,

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11/7/06



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Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 29 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

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VIII. CLAIMS APPENDIX

1. (Previously Presented) A high-density circuit module comprising:
a first CSP;
a second CSP disposed above the first CSP in stacked disposition;
a first form standard disposed, in substantial part, above the first CSP;
flex circuitry connecting the first and second CSPs and positioned to be, in part, beneath the first CSP and, in part, above the first form standard and beneath the second CSP, the flex circuitry comprising a first side and a second side and a covercoat on each of the first and second sides; and
at least one metallic bond attaching the flex circuitry and the first form standard.
2. (Original) The high-density circuit module of claim 1 further comprising a second form standard disposed, in substantial part, above the second CSP.
3. (Original) The high-density circuit module of claim 1 in which the flex circuitry is comprised of a first flex circuit and a second flex circuit which are each attached to the first form standard with at least one metallic bond.
4. (Original) The high-density circuit module of claim 1 further comprising a second form standard and in which the flex circuitry is comprised of a first flex circuit and a second flex circuit which are each attached to the first form standard with at least one metallic bond.
5. (Original) The high-density circuit module of claim 1 in which the metallic bond comprises tin and gold.
6. (Original) The high-density circuit module of claim 1 in which the metallic bond is created by combining a first metallic material applied to the first form standard and a second metallic material from which the flex circuitry is comprised.

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 30 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

7. (Original) The high-density circuit module of claim 6 in which the combining of the first metallic material and the second metallic material is achieved through a selected application of heat.
8. (Original) The high-density circuit module of claim 7 in which the selected application of heat is achieved with localized friction heating.
9. (Previously Presented) A high-density circuit module comprising:
 - a first CSP;
 - a second CSP stacked above the first CSP;
 - a first form standard associated with the first CSP;
 - a second form standard associated with the second CSP; and
 - flex circuitry comprising a first side and a second side and a covercoat on each of the first and second sides.
10. (Original) The high-density module of claim 9 further comprising flex circuitry connecting the first and second CSPs.
11. (Original) The high density module of claim 10 in which the flex circuitry is comprised of first and second flex circuits.
12. (Original) The high-density module of claim 10 in which the flex circuitry is attached to the first form standard with at least one metallic bond.
13. (Original) The high-density module of claim 12 in which the metallic bond is comprised of a first metallic material and a second metallic material.
14. (Original) The high-density module of claim 13 in which the first metallic material is comprised of tin and the second metallic material is comprised of gold.

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 31 of 34

Attorney's Docket No.: 21260-024001 / 234-094-CIP4/CIP-MB

15. (Original) The high-density module of claim 12 in which the metallic bond is realized by selective application of heat.

16. (Original) The high-density module of claim 13 in which the flex circuitry is comprised of a first flex circuit and a second flex circuit and each of the first and second flex circuits is attached to the first form standard with at least one metallic bond.

17. (Original) The high-density module of claim 10 in which the flex circuitry is attached to the first form standard with adhesive.

18. (Previously Presented) A method creating a high-density circuit module comprising the steps of:
providing a form standard
providing first and second CSPs;
attaching the form standard to the first CSP;
applying a first metallic material to at least one part of the first form standard;
providing flex circuitry comprising a first side and a second side and a covercoat on each of the first and second sides with an area where flex metallic material is exposed;
disposing the flex circuitry adjacent to the first form standard to create an area of contact between the flex metallic material and the first metallic material;
selectively applying heat to the area of contact.

19. (Original) The method of claim 18 further comprising the step of using vibration to perform the step of selectively applying heat to the area of contact.

20. (Original) The method of claim 18 in which the first metallic material is comprised of tin.

21. (Previously Presented) A unit for use in a stacked circuit module comprising:
a CSP;

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 32 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

a form standard attached to the CSP; and
flex circuitry attached to the form standard and comprising a first side and a second side
and a covercoat on each of the first and second sides.

22. (Original) The unit of claim 21 in which the flex circuitry is comprised of a first flex circuit and a second flex circuit.

23. (Original) The unit of claim 21 in which the flex circuitry is attached to the form standard with at least one metallic bond.

24. (Original) The unit of claim 23 in which the metallic bond is comprised of at least two metals.

25. (Original) The unit of claim 21 in which the flex circuitry is comprised of first and second flex circuits, each of which is attached to the form standard with at least one metallic bond.

26. (Previously Presented) A high-density circuit module comprising:
a first CSP;
a second CSP disposed above the first CSP in stacked disposition;
a first form standard disposed, in substantial part, above the first CSP;
flex circuitry connecting the first and second CSPs and positioned to be, in part, beneath the first CSP and, in part, above the first form standard and beneath the second CSP, the flex circuitry comprising at least two conductive layers; and
at least one metallic bond attaching the flex circuitry and the first form standard.

27. (Previously Presented) A unit for use in a stacked circuit module comprising:
a CSP;
a form standard attached to the CSP; and
flex circuitry attached to the form standard and comprising at least two conductive layers.

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 33 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

IX. EVIDENCE APPENDIX

No evidence is submitted.

Applicant : Partridge, et al.
Serial No. : 10/828,495
Filed : April 20, 2004
Page : 34 of 34

Attorney's Docket No.: 21260-024001 / 254-094-CIP4/CIP-MB

X. RELATED PROCEEDINGS APPENDIX

There are no related proceedings in which a decision has been rendered by a court or the Board.